

Project Management Planning

Configuration Management

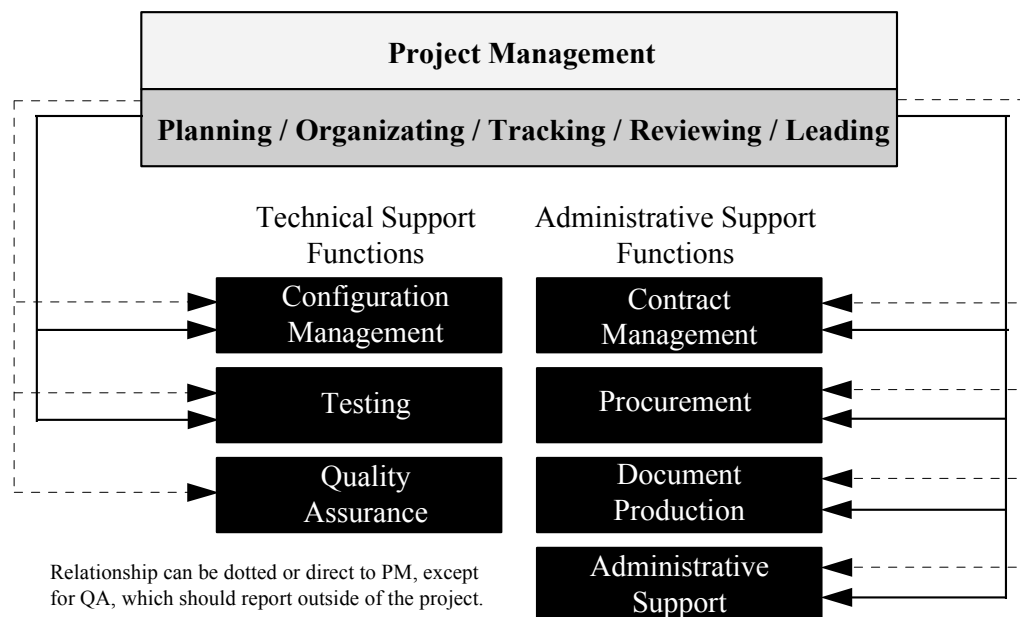
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Configuration Management: a Project Support Function

As stated throughout the *Project Planning* section, there are fundamental components that are started during the pre-performance stage of the project management life cycle in order for the project team to be able to do the necessary planning, organizing, monitoring, and controlling functions once the project has been base-lined and begun.

While the project manager, in theory, is responsible for all of the management aspects of a project, rarely can all of these tasks be performed by one person. In fact, some should not be performed by the project manager due to the time consuming nature of the function. These necessary support tasks can be divided into administrative and technical support functions and are shown in the following figure.

Project Management Support Functions



The administrative functions are fairly obvious and can be further expanded to include scheduling and budgeting in very large projects. Within the technical support functions, configuration management ensures that changes to the product being developed are controlled; quality assurance monitors and controls the quality of the product being developed; and testing verifies compliance of the product being developed to the stated requirements.

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It is the project manager's responsibility to organize the project support groups and to document their planned activities. In the basic project management

Terminology

plan, testing is considered part of the development life cycle to support a wide number of development methodologies currently in use by different state organizations. This does not preclude a state organization from developing a Testing Plan as part of the project plan. Agencies can, and often should, add this as one of the many optional sub-plans.

Within the general IT industry, neither the use nor the meaning of configuration management terms have been standardized. For the purposes of this document, the following terms apply to Configuration Management:

Configuration Management is the technical and administrative application of configuration control. It includes the maintenance of a configuration control organization, change and version control standards, and configuration of control facilities. Configuration management is a formal discipline that provides developers and users with the methods and tools that are used to identify the product developed, establish baselines, control changes to these baselines, record and track status, and audit the product.

Control item is a project element that is considered a unit for the purpose of configuration management. This may include such things as software modules, versions of software systems, the project design document, the project plans, and so forth.

Change control is the process of controlling, documenting, and storing the changes to control items. This includes proposing the change, evaluating it, approving or rejecting it, scheduling it, and tracking it.

Version control is applied to software being developed or installed. It is a method used to control the release and installation of software versions. This includes recording and saving each release and documenting the differences between the releases. Version control applies not only to developed software, but also to off-the-shelf software systems that are used as part of the project. For example, the operating system of a computer would be placed under version control and would be tested with software being developed before adding a new version to the development or operating environment.

Configuration control is the process of evaluating, approving or disapproving, and managing changes to controlled items.

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Configuration Management Organization

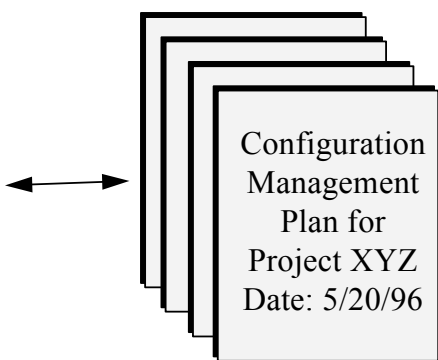
Effective configuration management requires an effective and well-defined configuration management organization. The configuration organization is responsible for:

- Defining who will be responsible for and have authority over configuration management.
- Setting standards, procedures, and guidelines for the full project team to follow.
- Defining tools, resources, and facilities to be used for configuration management.

This information is summarized in either a standard state organization configuration management policy manual and/or in the project Configuration Management Plan. This document could range from a few pages to hundreds of pages for very large software development activities with extensive procedures and control items. The detailed configuration management information is represented as a summary in the Project Management Plan. The relationship of the configuration management summary in the Project Management Plan and the detailed Configuration Management Plan is depicted in the following figure.

Project Management Configuration Management Summary

Project Management Plan Configuration Management	
Person(s) responsible for Configuration Management: (Should be represented on Organizational Chart)	<input type="text"/>
How will CM be performed throughout the life of the project	<input type="text"/>
What is the repository for control items (both automated and paper)	<input type="text"/>
How will project manager ensure that CM activities are done on a regular basis	<input type="text"/>



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Configuration Management Plan

The Configuration Management Plan can be a part of the Project Management Plan, it can appear as a separate document, or it can be contained within the overall quality plan. The project template page should contain a pointer to the location of the configuration plan if it is not within the project plan.

A sample Configuration Management Plan outline is shown below.

Sample Outline for a Configuration Management Plan

1. Configuration Management organization and resources

- 1.1 Organization structure
- 1.2 Personnel skill level and qualifications
- 1.3 Facilities needed
- 1.4 Equipment and tools used

2. Standards, procedures, policies, and guidelines

- 2.1 Diagram of information flow
- 2.2 Parameter for the automated tools sets

3. Configuration identification

- 3.1 Method for defining control item
- 3.2 Method for configuration control
- 3.3 List of control items

4. Identification methods

(Naming and marking of document, software components, revisions, releases, etc.)

5. Submission and retrieval of control items

6. Version control

- 6.1 Preparation of software and documentation versions
- 6.2 Release approval procedure

7. Storage handling and delivery of project media

Storage requirements (both automated and paper)

8. Relationship to contractor configuration management (include their plan and procedures if separate from state's processes)

9. Other information

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Tasks During the Planning Phase

During the planning process, the project manager defines the group or persons responsible for project configuration management and defines the procedure and required resources for performing configuration management. During the planning phase, the project team also identifies the control items. The goal is to:

- Explicitly assign configuration management's authority and responsibility for the project.
- Ensure that configuration management is implemented throughout the project's life cycle by setting standards, procedures, and guidelines that are produced and distributed to the full project team.
- Ensure that project management has a repository for storing configuration items and associated configuration management records.
- Ensure that QA reviews the baselines and configuration management activities on a regular basis.

Relationship to Quality and Change Management

Many of the issues related to configuration management are similar to the issues related to developing a project's quality system. In fact, in software development projects, many of the tasks for quality and configuration management overlap. For this reason, a clear definition needs to be established, even at the planning stage, as to who will play what role. Because of this strong relationship, many projects have pointers between the various quality and configuration management plans to avoid redundancy.

Authority and Responsibility

Every project includes some level of development or integration activity that requires configuration management. Projects need to include at least a manual configuration control process for storing, retrieving, and changing project requirement documents and management documents. The responsibility for configuration management is assigned and clearly shown in the project plan.

The configuration management authority and responsibility can be handled in one of two ways:

1. The state organization maintains a standard, enterprise-wide approach to configuration management and has an identified group responsible for these tasks on all projects undertaken; or
2. The project develops a sub-team within the project management structure to perform the configuration management. This team may be assigned to the project on a full-time or part-time basis depending on the size of the project.

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In either case, both the authority (to be able to make decisions on configuration control activities) and the

Configuration Elements

responsibility (to define what areas fall within configuration management) must be clearly defined. The configuration management authority is involved in all development activities and has the specific authority to approve or reject configuration items.

During the early stages of project planning, the project team, the person responsible for configuration management and the project manager defines the elements placed under configuration control. The list of control items is not standard. The best place to start is with the activity list and Work Breakdown Structure. Typically, all major milestones and deliverables are controlled. The actual software and hardware elements are also controlled.

Some of the more specific considerations include:

- **Hardware configuration, system architecture, and communication diagrams.**
- **Software, code, design documents, testing plan, and software review data.**
- **The Project Management Plan (schedules, budgets, contracts), support function plans, and correspondence and other documents necessary to recreate a project.**

Configuration Management Procedures

Procedures and tools are necessary to ensure successful implementation of a configuration management process. In the planning stage, fully defined configuration procedures are not necessary. In the management stage, the location of these detailed procedures and the definition of the process for enforcement are defined.

The plan also contains information on how the detailed procedures will be developed and specifies that these procedures are in place by project start-up. Some key processes to be addressed in the procedures include:

- How do developers and project team members request and retrieve configuration control items?
- What are the numbering, sequencing, and data processes to be used?
- Does the project contain sensitive or security-driven data; if so, will the configuration management meet the control requirements for this data?

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- Where is the location of controlled items, and how does the project team get access to them?
- What items will be placed under automated control and what items will be manually controlled?
- Will there be a change control board to determine when changes will be allowed, and how will this interface with the configuration management procedures?
- What is the relationship to the quality team if these functions are not performed by the same group?

The plan may also include diagrams and flow charts to describe procedures for submitting change requests and for reporting problems.

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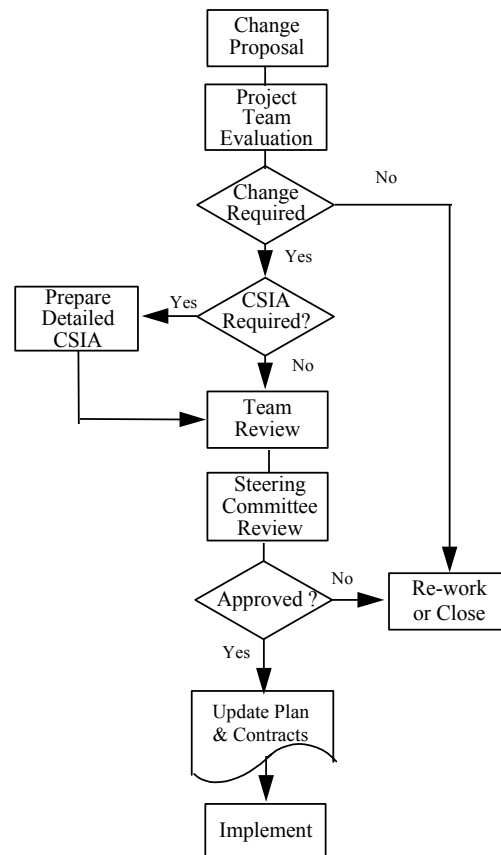
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Configuration Management Process Flow

The following figure portrays an overall flow of control items within a configuration management framework.

Control Item Flow within a Project



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Ensure that the Project has a Repository for Storing Configuration Items and Associated Configuration Management Records

The configuration management environment includes the resources necessary for the implementation of the configuration plan. This includes:

- Configuration control tools:
 - ⇒ Automatic version control and change control tools.
 - ⇒ Monitoring, reviewing, and registration of support utilities.
- Storage facilities -- a safe repository for all approved configuration items, including:
 - ⇒ On-site automated storage for the day-to-day development process.
 - ⇒ On-site paper storage for the day-to-day project for configuration control items that are not stored in automated form.
 - ⇒ Off-site storage for catastrophe recovery.

Configuration Management is one area in which many automated tools exist. Automated configuration control is best when used in a multi-user development environment, such as a LAN, to facilitate the sharing of project information and data and to allow for consistent application of the configuration management procedures. Controlled elements can be stored in a central database, and developer access is managed from a central configuration control system. Without such a system, added manual controls and additional tasks for the developers may need to be imposed. Multi-location development is another environment that could be more easily handled with automated tools.

Configuration Management Goes Beyond Development

Configuration management is a process that continues beyond the project development cycle and into the maintenance and operation phases. A project that has clearly implemented a successful configuration management process adds to the value of the system once it reaches maintenance.

Does This Sound Familiar?

We have all suffered from the by-product of not practicing configuration management. A large investment firm joined an information exchange service. This service could provide the investment firm with on-line access to a central database containing constantly updated information on investment plans, investment strategies, and values. In the world of investment, where life changes daily, this was an essential service for the investment firm. However, the investment firm's computer did not have the capability to interface with the information exchange service. The investment firm assigned a project manager to develop the necessary software that was needed for the interface.

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***Configuration
Management
Ensures That a
Project Moves
Forward***

After the integration phase began, one of the developers reported that a major milestone had been achieved: communications with the information service had been successfully established. The developer reported this and continued on with his integration tasks. A few days later, the project manager was going to demonstrate the communication connection for the executive management of the investment firm. When the project manager went to show management the connection, the demonstration would not work. The reason: additional changes had been made in the software program, and the integration of these changes had not been completed, so the previous functionality was no longer available.

The project did not have a configuration management system, and the developer had not “saved” a copy of the software without the additional changes. For this project, configuration management may have assisted in both selling the project and ensuring that development efforts continued moving forward.